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Control System of Antibiotics Production Pilot Plant (MEGBI-APP)

Version 2020

Developers & Operation Manual

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System Overview



(Thermocouple k)

(Thermocouple k)

1

Hardware and Development Environment

1.1 Human Machine Interface (DOP107-BV)

A human machine interface (HMI) is a platform which permits interaction between users and automation equipment.

The HMI adopt the latest Cortex-A8 / Dual Core high-speed processor and 65,536 color LCD screen with high brightness and contrast. In addition, they are equipped with the HMI programming software DOPSoft 4.0 and built-in Lua editor for easy programming as well as alarm / history log / user authority functions for highly efficient management.



1.1.1 Specifications

Model		DOP-107BV					
Panel type		7" TFT LCD (65535 colors)					
Display	Resolution	800 x 480 pixels					
	Backlight	LED backlight (half-life under room temperature 25°C > 20,000 hours)*1					
	Display range	154.08 mm * 85.92 mm					
	Brightness	400 cd / m² (Typ.)					
	CPU	ARM Cortex-A8 (800 MHz)					
Fla	sh ROM	256 Mbytes					
	RAM	256 Mbytes					
Tou	chscreen	4-wire resistive touchscreen > 1,000,000 operated					
E	uzzer	Multi-tone frequency (2 K – 4 KHz) / 80 dB					
Netwo	rk interface	N/A					
	USB	1 USB Slave Ver 2.0; 1 USB Host Ver 2.0					
	SD	N/A					
	COM1	RS-232 (supporting flow control) / RS-485 ^{*2}					
communica	tion COM2	RS-422 / RS-485 ^{*2}					
port	COM3	N/A					
Auxiliary	function key	N/A					
Ca	lendar	Built-in					
Coolir	ig method	Natural cooling					
Ар	provals	CE / UL (please use shielding network cable and magnetic ring with the filter 300 ohm / 100 MHz)					
Panel wa	terproof level	IP65 / NEMA4 / UL TYPE 4X (indoor use only)					
Operati	on voltage"2	DC +24V (-15% to +15%) (please use an isolated power supply) Supplied by Class 2 or SELV circuit (isolated from MAINS by double insulation)					
Leaka	ge current	500 V_{AC} for 1 minute (between DC24V terminal and FG terminal)					
Power co	onsumption ¹²	8.6 W (Max) ^{*3}					
Backu	p battery	3V lithium battery CR2032 × 1					
Backup	battery life	About 3 years or more at 25°C (subject to operation temperature and condition)					
Operation	temperature	0°C to 50°C (32°F to 122°F)					
Storage	temperature	-20°C to +60°C (-4°F to 140°F)					
Operating	environment	10% - 90% RH [0°C - 40°C], 10% - 55% RH [41°C - 50°C];					
Vibratio	n resistance	Conforms to IEC61131-2: continuous vibration 5 Hz - 8.3 Hz with amplitude 3.5 mm; 8.3 Hz - 150 Hz with amplitude 1G					
Shock	resistance	Conforms to IEC60068-2-27: 11 ms, 15 G Peak, in X, Y, Z directions each for 6 times					
Dim	iension	215 x 161 x 35.5					
Mountin	g dimension	106.0 × 140.0					
(W) >	(H) mm	190.9 X 142.9					
Weight		Approx. 700 g					

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1.1.2 Descripton

DOP-107BV (rear view)



1.1.3 Communication port pin assignment

DOP-107BV COM1

		MOL	DE1	MO	DE2	MODE3	
COM Port	Pin	COM1	COM2	COM1	COM2	COM1	COM2
		RS-232	RS-485	RS-485	RS-485	RS-232	RS-422
	1	-	-	D+	-	-	TXD+
	2	RXD	-	-	-	RXD	-
	3	TXD	-	-	-	TXD	-
	4	-	D+	-	D+	-	RXD+
\bigcirc $\$	5	GND		GND		GND	
	6	-	-	D-	-	-	TXD-
	7	RTS	-	-	-	RTS	-
	8	CTS	-	-	-	CTS	-
	9	-	D-	-	D-	-	RXD-

1.1.4 Model Description

	DOP	- 1	07	W	<u>v</u>			
						[Resolution	
							G : SVGA TFT (800x)	Q: WQVGA TFT (480x)
Product Name							S : WSVGA TFT (1024x)	V : WVGA TFT (800x)
DOP : Delta Operation	Panel						X : XGA TFT (1024x)	Z : No Display (Zero)
						- [Туре	
Series				L			B : Basic Type	
1 : 100 Series HMI							C : Standard General Typ	e
Disular Circ						n (E : Standard Ethernet Typ	be
	Display Size						W : Advanced Narrow Fra	me Type
	00 : Zero	03 : 4.3"	05 : 5.6"	7:7*	8:8"		M : Advanced Multimedia	Туре
	10 : 10.1" / 10.4"	12 : 12"	15 : 15"] `		

1.1.5 Software DOPSoft 4.0 for HMI programming

1.1.5.1 Create a Project

- We click on «File-New »

%			DOPSoft
File	View Tools Options H	Help	
	New	Ctrl+N	
-	Open	Ctrl+O	
	Open Screen Data		
	Print Setup		
	C:\Users\mohammad\Docun	ments\NewHMI.dpa	
	Exit		Version: DOPSoft-4.0.6.75
		L_+	HMI Model: DOP-100 series, DOP-107BV 65536 Colors
		Coren file	Description
		Recent opened	C:/Users\mohammad\Documents\NewHMLdpa

- We choose the HMI product ${\ll}107BV$ »
- We put a name in the «Project Name»
- We click on «Next »

	Projec	t Wizard			×
Carias	LIN I Liet				
DOP-100 series	Model Type	Resolution	Color		^
	10280	490 * 272	65526 Colore		
	10300	400 272	65536 Colors		
	10500	220 * 224	65536 Colors		
	10781/	800 * 480	65536 Colors		
	107CV	800 * 480	65536 Colors		
	1070V	800 * 480	65536 Colors		
	107EC	800 * 600	65536 Colors		
	107EV	800 * 480	65536 Colors		
	1071/	800 * 480	65536 Colors		
	107WV	800 * 480	65536 Colors		
	1081G	800 * 600	65536 Colors		
	11000	800 * 600	65536 Colors		
	11008	1024 * 600	65536 Colors		~
	Project Setup				
	Project Name:	NewHMI			
	Screen Name:	Screen_1			
	Screen No.	1			
	Printer:	ANULL		~	
	System Menu Language:	English		*	
	HMI Rotation:	0 ~	degree		
		Back	Next	Cancel	Finish AC

- We choose the following :

Port of communication « COM1 » Manufacturers : « Delta » Series : « Delta DVP PLC » Address of PLC Station : « 1 » Interface : « RS232» We choose the "communication parameters" that correspond to the PLC

- We click on «Finish »

Project Wizard									
	Communication Settings								
	Connection								
COM1	Link Name	Link1							
6	Manufacturers	Delta			~				
COM2	series	Delta DVP PLC			~				
	Main Extra Communication Parameters HMI Station Interface Data Bits Stop Bits Baud Rate Parity Bits I Optimize	0	Controller PLC Station Password Comm. Del Timeout(m Retry Cour	n ay s)	1				
			Deate	Numb	Const	Think of the			
			Back	INEXT	Cancel	rinish Acti			



1.1.5.2 Design a project

a. Add pages

To add pages, we click on « Screen-New Screen » or « Shift+N »



b. <u>Button (Write - Bit)</u> Set to On (ON Only) Set to Off (OFF Only) Maintained (OFF & ON)



Button

4	Screen_1	×	
		•	
		•	

- We press the button to display the properties

- We enter the address of bit device for PLC in the «Proporties - Write address $\ensuremath{\mathsf{w}}$

	Ν	laintained			×		
Preview	Main Main-2 Text	Picture Details	Macro	Coordinates			
	Memory Write Address: None Read Address:	Style Style Style For	e 'le: reground Color:	Standard ✓		Properties Maintained_001 {off} Write Address Road Address	v 0
	None	Bli	nk:	No 🗸		Invisible Address	None
State:	Write Offset Address:	Fil	ed style: e Text Pic:	Gradient v]	Offset Address Write Offset Addr Read Offset Addre	None None
Language: Language1 V	Read Offset Address: None					Text Size Font	off 16 Arial
Element description:						Color Ratio	RGB(0, 0, 0)
Maintained_001						Use Text Pic	No
						E Picture Picture Bank Name	None
						Picture Name	None

c. <u>Button - Goto Screen (Go to another page)</u>

We choose the name of the page we want to navigate to in the « Proporties - Goto screen »

		Goto Screen		×
Preview	Main Main-2	Text Picture	Details Macro Coordinates	
	Style		Detail	
	Style:	Standard v	Goto Screen: Screen_1	
	Foreground Color:	•		
	Function:	Goto Screen 🗸	Close Subscreen (The Goto Screen button is only valid on	
State:	Filled style:	Gradient v	subscreen.)	
0 ~	Use Text Pic:	No v	Set to low security level after screen chan	ge.
Language:				
Language1 v				
Element description: Goto Screen_002				

d. <u>Indicator (Read-Bit</u>	<u>()</u>		
S.			DOP
File Edit View Element Screen	n Tools O	ptions Window Help	
i 🗅 i 🖙 💾 🔂 i 🦘 🔶 i 🗶 📭 i	🗅 Q 🗟	🖳 🔒 📭 🕴 100%	• Q Q Q C D C
16 🔺 💁 Arial	- <i> </i> /	a 🗛 🗛 🗛 🗛	<u>A</u> - B <i>I</i> <u>U</u> // 🗷 🗵
🛃 🖿 🗲 A 🖷 🆽 🖬 🎝	: 🔳 🤤 🕰	🗢 💷 📑 N 🐼 📈	1 📖 🏥 📕 🔂 🌲 🛛 0 -
Project	₽ ×	O Multistate Indicator	_2
🔮 • 🖃		Range Indicator	
		Simple Indicator	
÷ 🖬 🕬			_



We enter the address of bit device for PLC in « Proporties - Read address »





We enter the address of Word device for PLC in the « Proporties - Read address »

1.2 DELTA PLC (DVP20SX211R)

DELTA PLC - DVP20SX211R



1.2.1 Specifications

- _ Program capacity: 16k steps/Data register: 10k words
- _ Higher execution speed compared to the competition: LD: 0.35µs, MOV: 3.4µs
- _ Built-in mini USB, RS-232 and RS-485 ports (Master/Slave) Supports standard MODBUS ASCII/RTU protocol and PLC Link function

_ Supports real time clocl for version 2.0 and above (no battery required) It operates for

at least one week after power off.

_Built-in 4 analog inputs / 2 analog outputs / 8 Digital Inputs & 6 Digital Outputs (Relay)

_ Supports DVP-S series left-side and right-side modules

_Power supply voltage : 24V DC

Built-in Analog I/O							
Ana	log Input	Analog Output					
Channels	4	Channels	2				
Resolution	12-bit	Resolution	12-bit				
Spec.	-20~20 mA or -10~10 V or 4~20 mA	Spec.	0~20 mA or -10 V~10 V or 4~20 mA				

1.2.2 Product Profile



1.2.3 Point Specifications

1.2.3.1 Input point Specifications

	Spec.		Input Point						
Items		24VDC (-15	24VDC (-15% ~ 20%) single common port input						
Input No.		X0, X2	X0, X2 X1, X3 X4 ~						
Input type			DC (SINK or SOURCE)					
Input Curren	t (± 10%)		24VDC, 5mA						
Input impeda	ance	4.7K Ohm							
Action lovel	Off→On	> 15VDC							
Action level	On→Off	< 5VDC							
Response	Off→On	< 2.5µs	< 10µs	< 20us					
time	On→Off	< 5µs	< 20µs	< 50us					
Filter time	ilter time Adjustable within 0 ~ 20ms by D1020 (Default: 10ms)								

1.2.3.2 Output point Specifications

	Spec.	Output Point
Items		Relay
Output No.		Y0 ~ Y5
Max. frequer	псу	1Hz
Working volta	age	250VAC, < 30VDC
	Resistive	1.5A/1 point (5A/COM)
Max. load	Inductive	#2
	Lamp	20WDC/100WAC
Response	Off→On	Approx 10 ms
time	On→Off	Αφρίολ. ΤΟ ΠΙΒ

1.2.3.3 Analog input & Analog output Specifications

Itoms	Ar	nalog Input ((A/D)	Analog Output (D/A)				
items	Voltage	oltage Current		Voltage	e Current			
Analog I/O range	±10V	10V ±20mA 4 ~ 20mA ^{#1}			0 ~ 20mA 4 ~ 20mA			
Digital conversion range	±2,000	±2,000	0 ~ +2,000	±2,000	0 ~ +4,000	0 ~ +4,000		
Resolution #2	12-bit							

1.2.3.4 Point Wiring

V0+	S/S
10+	X0
VI0-	X1
V1+	X2
11+	X3
VI1-	X4
V2+	X5
12+	X6
VI2-	X7
V3+	C0
V3+ 3+	C0 Y0
V3+ 3+ V 3-	C0 Y0 Y1
V3+ 3+ VI3- FE	C0 Y0 Y1 Y2
V3+ 13+ VI3- FE V00	C0 Y0 Y1 Y2
V3+ I3+ VI3- FE V00 I00	C0 Y0 Y1 Y2 C1
V3+ I3+ VI3- FE V00 I00 V01	C0 Y0 Y1 Y2 C1 Y3
V3+ I3+ VI3- FE V00 I00 V01 I01	C0 Y0 Y1 Y2 C1 Y3 Y4

1.2.3.5 Input Point Wiring

There are 2 types of DC inputs, SINK and SOURCE. (See the example below. For detailed point configuration, please refer to the specification of each model.)



1.2.4 Output Point Wiring

Output terminals, Y0, Y1, and Y2, of relay models use C0 common port; Y3, Y4, and Y5 use C1 common port; as shown in the Figure . When output points are enabled, their corresponding indicators on the front panel will be on.



Relay (R) output circuit wiring





1.2.5 Analog input A/D & Analog output D/A External Wiring



1.2.6 DVP20SX2 Memory Map

				Sp	ecifications				
Control N	∕leth	od			Stored program, cyclic scan system				
I/O Proce	essir	na Method			Batch processing method (when END instruction is				
					executed)				
Executio	n Sp	beed			LD instructions – 0.54µs, MOV instructions – 3.4µs				
Program	Program language				Instruction List + Ladder + SFC				
Program	Program Capacity				158/2 steps				
	x	External	inputs		points max.	Total 480+32			
	Y	External	outputs		Y0~Y377, octal number system, 256 points max.	I/O(*4)			
		Auvilian	General		M0~M511, 512 points, (*1) M768~M999, 232 points, (*1) M2000~M2047, 48 points, (*1)	Tatal			
	м	relay	Latched		M512~M767, 256 points, (*2) M2048~M4095, 2048 points, (*2)	4096 points			
			Special		M1000~M1999, 1000 points, some are latched				
					T0~T126, 127 points, (*1)				
			100ms (M1028=ON, T64~T126: 10ms)		T128~T183, 56 points, (*1)				
					T184~T199 for Subroutines, 16				
					points (*1)				
					T250~T255(accumulative), 6 points				
	Т	Timer			(*1)	Total			
			10ms	~	1200~1239, 40 points, (*1)	256 points			
			(M1038=)	ON, 45: 1mc)	1240~1245(accumulative),				
			1200~1245. IMS)		6 points, (*1)				
Bit			1mc		127, 1 points, (1) 246~T249(accumulative) 4 points				
Contacts			mis		1246~1249(accumulative), 4 points, (*1)				
Contacto									
					C0~C111, 112 points, (*1)				
			16-bit cou	unt up	C128~C199, 72 points, (*1)	Total			
					C112~C127, 16 points, (*2)	233 points			
			32-bit cou	unt	C200~C223, 24 points, (*1)	200 points			
			up/down		C224~C232, 9 points, (*2)				
					C235~C242, 1 phase 1 input, 8				
		Question		Soft-	points, (*2)				
	C	Counter	32bit	ware	C233~C234, 2 phase 2 input, 2				
			high-		points, (*2) C242-C244_1 phase 1 input_2	Total			
			speed		C243~C244, 1 phase 1 input, 2	10idi 22 pointe			
			count	Hard	C245~C250_1 phase 2 input_6	22 points			
			up/down	ware	points (*2)				
				indire.	C251~C254 2 phase 2 input, 4				

Initial step point Zero point return

Latched

General Alarm

Step

point

s

points, (*2) S0~S9, 10 points, (*2) S10~S19, 10 points (use with IST

Total 1024

points

instruction), (*2) S20~S127, 108 points, (*2) S128~S911, 784 points, (*1)

S912~S1023, 112 points, (*2)

	Specifications								
	Т	Current	value		T0~T255, 256 words				
	0	Current value			C0~C199, 16-bit counter, 200 words				
	0	Current	Current value		C200~C254, 32-bit counter, 55 words				
					D0~D407, 408 words, (*1)				
			Gene	ral	D600~D999, 400 words, (*1)				
Word					D3920~D9799, 5880 words, (*1)				
			Latch	bod	D408~D599, 192 words, (*2)				
Degister			Latur	icu	D2000~D3919, 1920 words, (*2)				
Register	Б	Data	Spec	ial	D1000~D1999, 1000 words, some	Total			
	U	register	Spec	iai	are latched	10000 points			
			Righ- modu	side special Ile	D9900~D9999, 100 words (*1) (*6)				
			Left-s modu	side special Ile	D9800~D9899, 100 words (*1) (*7)				
			Index	(E0~E7, F0~F7, 16 words, (*1)				
	Ν	Master	control	loop	N0~N7, 8 points				
	Ρ	P Pointer			P0~P255, 256 points				
					1000/1001(X0), 1100/1101(X1), 1200/12	201(X2),			
			Exter	nal interrunt	1300/1301(X3), 1400/1401(X4), 1500/1501(X5),				
			External interrupt		I600/I601(X6), 1700/I701(X7), 8 points (01: rising-				
		Interrupt Service			edge trigger _1, 00: falling-edge trigger _)				
Pointer			Timer interrupt High-speed counter interrupt		1602~1699, 1702~1799, 2 points (Timer resolution =				
	1				1ms)				
	· ·				1805~1899, 1 point (Timer resolution = 0.1ms)				
					(Supported by V2.00 and above)				
					1010, 1020, 1030, 1040, 1050, 1060, 1070, 1080, 8				
					points				
			Com	munication	1140(COM1), 1150(COM2), 1160(COM3), 3 points,				
			Interr	upt	(*3)				
					K 32 768 ~ K32 767 (16 bit operatio	n)			
	ĸ	Decima			$K_{-32,700} \approx K_{32,707} (10-bit operation K_{-32,700} \approx K_{32,707} (10-bit operation K_{-32,707} (10-bit operation K_{-32,7$	11), (32_hit			
Constant		Decima			operation)				
Constant					H0000 ~ HEEEE (16-bit operation)				
	н	Hexade	cimal		H0000000 ~HEFEFEFE (32-bit operation)				
					COM1: built-in RS-232 ((Master/Slave)				
				~ ~ ~	COM2: built-in RS-485 (Master/Slave)				
				SA2	COM3: built-in RS-485 (Master/Slav	e)			
Operiol De					COM1 is typically the programming	port.			
Serial Po	ns				COM1: built-in RS-232 ((Master/Slav	ve)			
				ev2	COM2: built-in RS-485 (Master/Slav	e)			
				5/2	COM3: built-in USB (Slave)				
					COM1 is typically the programming	port.			
Real Tim	e C	lock			Year, Month, Day, Week, Hours, Min	utes, Seconds			
					Right side: Up to 8 I/O modules can	be connected			
Special I	0	lodules			Left side: Up to 8 high-speed I/O mo	dule can be			
					connected				
File Regi	ster	(*5)			K0~K4999, 5000 points (*2)				

1.2.7 Software "WPL Soft" for PLC programming

1.2.7.1 Create a Project

- We click on «File-New »

3															
File	<u>E</u> dit	Com <u>p</u> iler	Co <u>m</u> ments	<u>S</u> earch	View	Communicatio	m	<u>O</u> pt	ions	Wiz	card	Win	ıdow	H	elp
	<u>N</u> ew					Ctrl+N	1	0		Ŧ	3	0	1	-	*
Ē	<u>O</u> pen					Ctrl+O		0	•		g.	K	-11-	CODE	
	Save					Ctrl+S	F		-			1.1	CODE	-11-	010
	Save <u>A</u> s	5			C	Ctrl+Alt+S	L								
	<u>C</u> lose P	roject					L								
8	Print					Ctrl+P	L								
4	Print Se	etup					L								

- We choose the PLC product «SX2 »
- We put a name in the «File Name»
- We click on «OK »

Select a PLC Model						
Program Title						
Model Type PLC 💌						
Select SX2						
Communication Setting						
RS232 (COM0) Setting						
File Name						
Ex1						
OK Cancel						

1.2.7.2 The necessary steps to download the program on the PLC

We Use Programming cable (UC-PRG020-12A) connecting a computer and a PLC.



- We click on "Communication setting- RS232 " to check the port (COM).
- we put The PLC address in Station address

🔛 湿 嘩 🔮 🖄 🖽 🖮	Communication Setting
Relay Type ㅓㅏ 루탑 루알 후항 후학	Connection Setup
Communication Setting	lype RS232
✓ RS232	Communication Setting
DVPEN01-SL	COM Port COM4 © ASCII
IFD9506	Data Length 7 🗸 C RTU (8 bits)
IFD9507	Parity Even 💌
DVPFEN01	Stop Bits 1 • Auto-detect
DirectLink	Baud Rate 9600 💌
	Station Address 2 Default
DEthernet	Ethernet Setting
	Assign IP
	Port 502
	Baud Rate Decided by
	PLC Setting
	C WPL Setting
	Setup Responding Time
	Times of Auto-retry 3
	Time Interval of Auto-retry (sec.) 3

1.2.7.3 Downloading a PLC program

To download the program, we click on the following form :

8		Ex1 - Delta WPLSoft
<u>F</u> ile <u>E</u> dit Com <u>p</u> iler Co <u>m</u> ments <u>S</u>	earch <u>View</u> Communication <u>Options</u> Wizard <u>Wind</u>	low <u>H</u> elp
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Ethernet Improvement		
	Instruction List Mode	

9

1.2.7.4 Monitoring a Program

To monitor the program's work in the PLC, we click on the following form:



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Connecting the sensors & actuators

2.1 Control Panel

2



2.2 Pump 1



Power circuit between the Switch & the Pump 1





Switch of Pump 1



2.3 Solenoid valve





Voltage: AC220V Fluid Temperature: 0~200°C

Connecting between the PLC & the Solenoid valve



Control circuit between the PLC & the relay 1



Power circuit between relay 1 & solenoid valve



Solenoid valve

2.4 Electric Mixer



Voltage: AC220V



Connecting between the PLC & the electric Mixer



Control circuit between the PLC & the relay 2



Power circuit between relay 2 & Electric Mixer





2.5 Electric Actuator Valve 1



Voltage: AC220V







Power circuit between relay 3 & Actuator valve 1



Actuator valve 1

2.6 Pump 2



Voltage: AC220V

Connecting between the PLC & the Pump 2





Power circuit between relay 4 & the Pump 2



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2.7 Electric Actuator Valve 2



Voltage: AC 24V



Connecting between the PLC & the Actuator Valve 2



Power circuit between relay 5 & Actuator valve 2



Actuator valve 2

2.8 Resistor of Heater







Connecting between the PLC & the Resistor of Heater



Control circuit between the PLC & the Contactor



Power circuit between Contactor & the Resistor of heater



Resistor

2.9 Pressure sensor of heater





MODEL : GPT220 Range : 0-16bar Output : 4-20 mA Power : 12- 36VTemperature : 220^{0} C



Connecting between the PLC & the Pressure sensor



2.10 Temperature sensor of penicillin fermenter tank



Temperature sensor (K-Thermocouple)



AD959 device

+INC1	0	14 🗖 - IN
+C 2 +T 3		13 -ALM 12 +ALM
	AD595	11 + V
-T 🗖 5		
		9_1V0 8_1FB



Connecting between the PLC, the AD959 device & the Temperature



2.11 Temperature sensor of Heater tank



Temperature sensor (K-Thermocouple)



AD959 device

+IN[]1	0	14 🗖 - IN
+C 2		13 - ALM
+T 🗖 3		12 +ALM
сом 4	AD595	11 □ +V
-T 🗖 5		10 COMP
-C 6		9 VO
-V口7		8 FB



<u>Connecting between the PLC, the AD959 device & the Temperature</u> <u>sensor (K-Thermocouple)</u>



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3 Control system for PLC & HMI

3.1 Programme of PLC

	Program code (please click and open in any editor, e.g.
MEGBI-APP-Control System.dvp	notepad++)

Control system for PLC & HMI

Programme of PLC

System res	et		
мо — / —		RST	М1
		RST	М2
		RST	МЗ
		RST	M4
		RST	М5
		RST	М6
		RST	М7
		RST	мв
		RST	м9
1		BST	мя
		BST	M10
		BST	M11
		BST	M12
		BST	M13
		BST	M14
		BST	M15
		BST	M16
		RST	M17
		RST	M18
		.RST	D10
		RST	D11
		RST	D12
		RST	D15
		RST	D16
		RST	D17
		RST	D18
			END

3.2 HMI Program

3.2.1 Auto mode

Press "Start"

- Start Timer 1 of tank 1, Mixer ON
- Delay 168 hours (7 days)
- ➢ If Timer 1= 168 hours, Open Valve 1
- Start Timer 2 of tank 2
- > If Timer 2 = 1 hour, Open Valve 2
- > Pump 2 ON for 5 min after Valve 2 is open

3.2.2 Manuel mode (interactive)

Press "Start"

Fermentation pen cilium :

- a) Mixer:
 - Press "Manual"
 - for OFF Press "Manual OFF"
 - for ON press "Manal ON"
- b) Valve :
 - Press "Manual"
 - for Open Press "Manual Open"
 - for Close press "Manal Close "

Charcoal treatment :

- a) Valve :
- Press "Manual"
- for Open Press "Manual Open"
- for Close press "Manal Close "
- b) Pump : (if valve 2 Close, Pump not working)
- Press "Manual"
- for OFF Press "Manual OFF"
- for ON press "Manal ON"

Autoclave system:

- a) Heater :
- Press "Manual"
- for OFF Press "Manual OFF"
- for ON press "Manal ON" (if Temperature > 122° C Heater OFF)
- b) Solenoid valve
- Press "Manual"
- for Open Press "Manual Open"
- for Close press "Manual Close"

3.2.3 HMI pages

3.2.3.1 Main page

3.2.3.2 Fermentation pencilium page

I Screen_5 □ Sc	reen_4 × Screen_3 Screen_6	
Antibiotics production pilot plant (MEGBI-APP)		
	FERMANTATION PENICILIUM	
Mixer	AUTO Manual OFF Status OFF Timer 1234 min	
Timer	1234 H 1234 min	
Temp	1234 C	
Valve	AUTO Manual Close Status Close	

3.2.3.3	Charcoal treatment page		
	Image: Screen_5 x image: Screen_4 image: Screen_3 image: Screen_6 image: Scre		
	Antibiotics production pilot plant (MEGBI-APP)		
	Charcoal treatment		
	Timer 1234		
	Valve AUTO Manual Close Status Close		
	Pump AUTO Manual OFF Status OFF		

3.2.3.4 Autoclave system page

	een_4 🖸 Screen_3 🗖 Screen_6 ×
Antibiotics production pilot plant (MEGBI-APP)	
	Autoclave Systeme
Heater	AUTO Manual OFF Status OFF
Temp	1234 C
Valve	AUTO Manual Close Status Close
Timer o	of Sterilization 1234 min